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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09 500,288	02 08 2000	Shinichi Nagahama	NICHIA-00800	2385

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EXAMINER

LOUIE, WAI SING

ART UNIT

PAPER NUMBER

2814

DATE MAILED: 08/12/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/500,288	NAGAHAMA ET AL.	
	Examiner	Art Unit	
	Wai-Sing Louie	2814	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 20 June 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 7-22 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 7-22 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s): _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 17 and 19-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Koide (JP 11-145516) in view of Kern et al. (US 6,194,742).

With regard to claim 17, Koide discloses a gallium nitride semiconductor diode ([0001] to [0023] and fig. 2) comprising:

- A GaN substrate 22 having a sapphire substrate 1 and a single-crystal GaN layer 3 formed on the sapphire substrate 1, the single-crystal GaN layer formed through a lateral-growth process ([0007] to [0015] and fig 2);
- Koide discloses a small crack-preventing layer 21 made of $\text{Al}_a\text{Ga}_{1-a}\text{N}$ ($0 < a < 0.15$) and contacting the substrate (Koide [0015] and fig. 1). Although, the mole fraction of aluminum is not $0 < a < 0.1$ as claimed. However, in the case where the claimed ranges “overlap or lie inside the ranges disclosed by the prior art” a prima facie case of obviousness exists (*In re Wethelm*, 541 F2d 257, 191 USPQ 90 (CCPA 1976); *In re Woodruff*, 919 F2d 1575, 1578, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990)). Similarly, a prima facie case of obviousness exists where the claimed ranges and the prior art ranges do not overlap but are close enough that

one skill in the art would have expected them to have the same properties

(*Titanium Metals Corporation of America v. Banner*, 778 F.2d 775, 227 USPQ

773 (Fed. Cir. 1985); See MPEP 2144.05). Koide does not disclose the AlGa_N

layer 21 has a coefficient of thermal expansion less than that of GaN substrate 22.

However, Kern et al. disclose a LED having an AlGa_N device-forming layer

(interfacial layer 16). Kern et al. disclose the coefficient of thermal expansion of

GaN and AlN (see col. 2, table 1). By estimation, the coefficient of thermal

expansion of Al_aGa_{1-a}N is about 4.45×10^{-6} /K, when $a=0.1$. The coefficient of

thermal expansion of AlGa_N layer is, therefore, less than GaN substrate thereby

providing compression strain on the AlGa_N crack-preventing layer (Kern col. 4,

lines 29-32). Therefore, it would have been obvious that the AlGa_N layer 21 has a

coefficient of thermal expansion less than that of GaN substrate 22;

- Koide disclose a gallium nitride light emitting diode formed on a GaN substrate (col. 1, lines 20-25), but does not disclose the rest of the light emitting structure. However, it is common in the art to have an n-type cladding layer containing Al, an active layer containing InGa_N, a p-type cladding layer containing Al in a light emitting structure such as disclosed in Kern et al. (fig. 3). Therefore, it would have been obvious to provide a light emitting structure above the single-crystal GaN layer 3.

With regard to claims 19-20, Koide discloses the small crack-preventing layer 21 has a thickness of 5 micron (Koide [0015]).

With regard to claim 21, Koide discloses the small crack-preventing layer 21 has been grown without an impurity doping (Koide [0015] to [0016]).

With regard to claim 22, Koide, modified by Kern et al. in claim 17 above, would disclose an InGaN layer 16 is intervened between the small crack-preventing layer and the n-type cladding layer (Kern col. 2, line 63 to col. 3, line 5 and fig. 3).

Claim 18 is rejected under 35 U.S.C. 103(a) as being unpatentable over Koide (JP 11-145516).

With regard to claim 18, Koide disclose the n-type cladding layer contains Al, but do not disclose it contains more Al than the small crack-preventing layer 21. Since the applicant has not established the criticality of the Al concentration stated and since these concentrations are in common use in similar devices in the art, it would have been obvious to one of ordinary skill in the art to use these value in the device. Where patentability is said to be based upon particular chosen dimension or upon another variable recited in a claim, the applicant must show that the chosen dimensions are critical. *In re Woodruff*, 919 F2d 1575, 1578, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990).

Response to Arguments

Applicant's arguments with respect to claims 7-22 have been considered but are moot in view of the new ground(s) of rejection with a different primary reference (Koide JP-11-145516).

Application/Control Number: 09/500,288
Art Unit: 2814

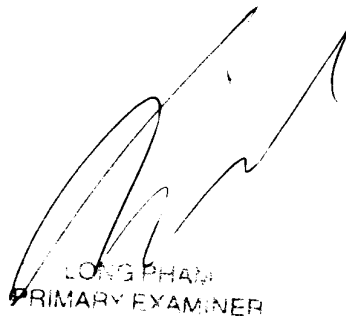
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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Wai-Sing Louie whose telephone number is (703) 305-0474. The examiner can normally be reached on 7:30 AM to 4:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael Fahmy can be reached on (703) 308-4918. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 308-7722 for regular communications and (703) 308-7722 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

wsf
August 4, 2003


LONG PHAN
PRIMARY EXAMINER